

SUPPORT FOR THE AMENDMENTS

Claims 1-26 were previously canceled.

Claims 27 and 44 are canceled herein.

Claims 28, 30-36, 39-41, and 45-50 have been amended.

The amendment of Claims 28, 30-36, 39-41, and 45-50 is supported by original Claims 1-26 and the corresponding previously pending claims. Further support for the amendment of Claim 28 is provided by the specification as filed, for example, at page 11, line 31 to page 12, line 25 and page 18, line 30 to page 19, line 4.

No new matter has been added by the present amendment.

REMARKS

Claims 28-43 and 45-50 are pending in the present application.

The rejections of:

- (a) Claims 27-34, 36-40, 42, 44, 46, and 50 under 35 U.S.C. §103(a) over Podszun in view of Neev;
- (b) Claim 35 under 35 U.S.C. §103(a) over Podszun in view of Neev and further in view of Kar;
- (c) Claim 41 under 35 U.S.C. §103(a) over Podszun in view of Neev and further in view of Melisaris and Kawasaki;
- (d) Claims 43, 48, and 49 under 35 U.S.C. §103(a) over Podszun in view of Neev and further in view of Bredt;
- (e) Claims 45 and 48, and 49 under 35 U.S.C. §103(a) over Podszun in view of Neev and further in view of Householder; and
- (f) Claim 47 under 35 U.S.C. §103(a) over Podszun in view of Neev and further in view of Melisaris-2,

are respectfully traversed.

In the Advisory Action mailed March 23, 2010, the Examiner has indicated that the response filed on March 10, 2010, has been considered but does not result in the allowance of this application. On the continuation sheet attached to the Advisory Action, the Examiner provides the basis of for maintaining the rejection, which is essentially the same as set forth in the final Office Action. Applicants maintain the previous traversal of these rejections, but have nonetheless amended the claims to (i) make Claim 28 the sole, pending independent

claim and (ii) more specifically define step (b) in Claim 28. Accordingly, the present invention provides, inter alia, a process for producing a three-dimensional object comprising

- a) providing a layer of a pulverulent substrate comprises a polymer
- b) controlling the temperature of a manufacturing chamber by supplying heat to said layer to bring said layer to an elevated temperature or to maintain said layer at an elevated temperature below the melting or sintering temperature of the polymer in said pulverulent substrate
- c) selectively applying an absorber in a suspension or a liquid absorber via an inkjet process to a region to be sintered
- d) applying other specific liquids or suspensions with certain properties
- e) selectively melting regions of the layer of the pulverulent substrate by introducing electromagnetic energy via a laser of wavelength from 100 to 3000 nm
- f) cooling the molten and non-molten regions to a temperature which allows the moldings to be removed intact
- g) removing the moldings. (see Claim 28)

The present invention improves upon existing methods heretofore employed in the process of laser-sintering (rapid prototyping) where typically a specific high-end laser (e.g., a CO₂ laser) is employed with a wavelength in the far infrared region (e.g., 10 600 nm). Thus, the claimed invention provides a method by which common lasers that generate electromagnetic radiation with a wavelength of from 100 to 3000 nm can be used. This method is made possible by using a specific absorber is selectively applied via an inkjet process to those regions to be melted of the respective layer. Another important feature of the presently claimed invention is the requirement in step (b) that the temperature of a manufacturing chamber is controlled by supplying heat to the layer to bring the same to an

elevated temperature or to maintain the layer at an elevated temperature below the melting or sintering temperature of the polymer in the pulverulent substrate.

Podszun is cited by the Examiner as disclosing a laser sintering method with a layer of a pulverulent substrate where a laser (e.g., Nd-YAG) with a wavelength of 500 to 1500 nm is used to sinter particulate plastic powders in a defined three-dimensional object and where an IR absorber is also employed. In the method disclosed by Podszun, controlled sintering is achieved by the selective melting by introduction of electromagnetic energy via a laser. However, at no point do Podszun disclose or suggest the selective application of the absorber by an ink jet process. Further, Podszun fails to disclose or suggest the limitations of step (b) with respect to the temperature control.

These distinctions are important as an unexpected effect of the present invention is that selectivity can be achieved merely by printing an absorber instead of via selective focused application by means of a laser (meaning that focusing of the laser is not necessary). Podszun is representative of the art that the claimed invention improves where the selectivity is achieved by selectively guiding the laser beam over the area to be fused.

The specification addresses the problems existing in the art prior to the present invention when selective laser sintering is used, similar to Podszun:

The process of laser-sintering (rapid prototyping) to realize moldings composed of pulverulent polymers is described in detail in the patent specifications US 6,136,948 and WO 96/06881 (both DTM Corporation). The SLS processes described in the prior art have the disadvantage that expensive laser technology is needed for the process. The laser functioning as energy source is extremely expensive and sensitive, as also is the optical equipment needed for the provision and control of the laser beam, for example lenses, expanders, and deflector mirrors.

A disadvantage of the known process is that it cannot use some of the lasers available on the market. In order to permit sintering of polymer powder or of particles encapsulated with plastic, a CO₂ laser is required, which is expensive to purchase and expensive to service,

operate, and maintain. A characteristic feature of the CO₂ laser is the wavelength of 10 600 nm. This corresponds to the far infrared region. A complicated mirror system therefore has to be used in order to conduct the laser beam across the construction plane; in addition, the laser requires constant cooling. Optical conductors cannot be used. Specifically trained operating staff generally have to be made available. Many end users are therefore unable to use these systems. However, use cannot be made of lower-cost lasers of wavelength in the middle or near infrared region, in the visible light region, or the ultraviolet region, because these cannot generally melt plastics, or not to the extent required for laser sintering. (see page 1, line 18 to page 2, line 11).

Moreover, with respect to the temperature control in step (b), in the claimed invention heat is supplied to the layers to be sintered in order to bring them to an elevated temperature or to hold them at an elevated temperature below the melting or sintering temperature of the polymer being used. In this way the electromagnetic energy needed for selective melting can be reduced. This necessitates the existence of a temperature-regulated build-up field, although it reduces the probability of the occurrence of curl (rolling up of corners and edges from the build-up plane, a phenomenon that can make it impossible to repeat step (a)). It is of decisive importance that the powder have the proper temperature (step b) before step (e) is performed. Otherwise the components could become warped or the melt may not coalesce properly, thus leading to poor components.

Podszun does not appreciate these problems with mere selective laser sintering or not controlling the temperature as recited in step (b) of the presently claimed invention. Additionally, none of the secondary references disclose the problems existing in the art represented by Podszun. The Supreme Court has held that the discovery of a problem or a cause of a problem can lend patentability to an invention. The discovery of a problem is often the key to making a patentable invention. Thus, the patentability of an invention under 35 U.S.C. §103 must be evaluated against the background of the highly developed and specific art to which it relates, and this background includes an understanding of those

unsolved problems persisting in the art solved by the invention. *See, Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 43 S.Ct. 322, 67 L.Ed. 523 (1923).

The Examiner, in the Advisory Action, points to page 1, lines 26-27 of Podszun as allegedly recognizing the limited accuracy of 3D objects. This recognition does not pass the threshold test of *Eibel Process* and certainly does not offer any appreciation for the deficiencies existing in the art, as represented by Podszun, prior to the present invention. Indeed, it cannot be fairly represented that Podszun or any other reference of record appreciate these problems with mere selective laser sintering or not controlling the temperature as recited in step (b) of the presently claimed invention.

The Examiner alleges that the first deficiency in Podzun (selectivity) is compensated for by Neev. Applicants disagree at least for the foregoing reason (i.e., Neev does not appreciate the problems existing in the art represented by Podszun). Applicants further submit the presently claimed invention differs from the combined disclosures of Podszun and Neev with respect to the combination and sequence of the steps. In Neev, for example, a completely different method is claimed, wherein material is chopped or abraded, but not melted and built up in layered parts. Of equal importance, in Neev, the substrate is not pulverulent and, therefore, the absorber is not applied with inkjet technology or is at least contained in a printable fluid in a relevant process.

The Examiner disregards this argument for a number of reasons. First, the Examiner alleges that a specific order of steps is not imposed by the claim language and the specification does not make any such distinction. For example, looking at claim 28, there is no requirement that the pulverulent substrate is provided before the temperature of the manufacturing chamber is controlled. What is missed in this treatment by the Examiner is

that Podszun and Neev do not disclose the method of the claimed invention and, necessarily, fail to disclose the specific steps and order thereof.

The Examiner also disregards the argument that the absorber is not applied with inkjet technology in Neev, and the substrate is not pulverulent. With respect to application of the absorber, the Examiner points to the disclosure at column 42, lines 37-42 of applying an absorbing agent through an ejector, which can be similar to an “exemplary ink jet injection technology available from the commercial ink jet printer industry.” However, the Examiner is reminded that the substrate and the method disclosed by Neev is not the same or remotely similar to that disclosed by Podszun or claimed in the present application. Indeed, in Neev a completely different method is claimed, wherein material is chopped or abraded, but not melted and built up in layered parts. This is not what is occurring in the presently claimed invention. In the Advisory Action, the Examiner again alleges that Neev disclose thus use of inkjet technology. However, Applicants once again submit that Neev represents a completely different method with its own unique problems and complications. As such, there is nothing in Neev that suggests modification of the method of Podszun to apply an absorber with inkjet technology.

The Examiner also points to Podszun as disclosing the pulverulent substrate. Podszun may disclose a pulverulent substrate; however, the substrate and method of Podszun are in no way the same as in Neev. Thus, the artisan in possession of Podszun and Neev would not be motivated to selectively insert the absorber disclosed by Neev into the process of Podszun without also modifying the process of Podszun and the substrate of Podszun to be compatible with the entirety of the disclosure of Neev.

Thus, Podszun and Neev fail to provide any suggestion that their technology and processes could in any way be combined. Even if it is the Examiner’s position, which

appears to be maintained in the Advisory Action mailed March 23, 2010, that modifications in the cited references would have been within the general abilities of the skilled artisan, a statement that modifications of the prior art to meet the claimed invention would have been “well within the ordinary skill of the art at the time the claimed invention was made” because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

The Examiner takes exception to this argument and the argues in the Advisory Action mailed March 23, 2010, that an “obvious to try” standard is not employed. The Examiner argues that “Podszun teaches that 3D precision is a known area for improvement in the field and Neev teaches the use of an absorber to ‘create highly precise material... modification in three dimensions’, therefore a skilled artisan would be motivated to incorporate aspects of Neev to produce the highest degree of precision possible.” The Examiner’s position can be summarized as:

- Reference A says their method might not be too good;
- Reference B suggests a step in an unrelated method to Reference A;
- The artisan would be motivated to try the step in the unrelated method of Reference B in the method of Reference A to see if and how it might affect precision

Applicants wonder how such a position can be anything other than an allegation that it would be “obvious to try”. A lion in sheep’s clothing is still a lion.

KSR International Co. v. Teleflex Inc., 550 U.S. ___, 82 USPQ2d 1385 (2007) does not eliminate the “obvious to try is not obvious” standard, as it clearly states that “obvious to try” may constitute obviousness, but only under certain circumstances. Specifically, *KSR*

stated that the fact that a claimed combination of elements was “obvious to try” might show that such combination was obvious under 35 U.S.C. § 103, since, if there is design need or market pressure to solve problem, and there are finite number of identified, predictable solutions, person of ordinary skill in art has good reason to pursue known options within his or her technical grasp, and if this leads to anticipated success, it is likely product of ordinary skill and common sense, not innovation. However, the Examiner offers nothing to show how these factors apply and whether there would be such an expectation or anticipated success.

Applicants respectfully submit that the Examiner has not offered any evidence that there is a recognized “design need or market pressure to solve the problem”. Indeed, the cited references make no suggestion that such a need even exists. Further, the Examiner fails to show that there are a “finite number of identified, predictable solutions”. In fact, there is nearly an infinite number of ways that the references may be combined with respect to the various components and steps disclosed therein.

The Examiner also does not provide any evidence that a “person of ordinary skill in art has good reason to pursue known options within his or her technical grasp”. It is clear from the references themselves that the artisan had no such reason to modify the various disclosures to arrive at the claimed invention. All that the Examiner appears to provide is that arriving at the combination of components may be within the general abilities of the skilled artisan, but again this is not the proper standard for obviousness (*Ex parte Levensgood*). Indeed, absent Applicants disclosure to serve as the guidepost, no objective reason to combine the teachings in a way that would place the artisan in possession of the claimed invention can be found.

At best, the combined disclosures could be taken as an “invitation to experiment” or could be viewed as providing an “obvious to try” argument. However, “obvious to try” has

long been held not to constitute obviousness. *In re O'Farrell*, 7 USPQ2d 1673, 1680 81 (Fed. Cir. 1988). A general incentive does not make obvious a particular result, nor does the existence of techniques by which those efforts can be carried out. *In re Deuel*, 34 USPQ2d 1210, 1216 (Fed. Cir. 1995).

Moreover, the Examiner is reminded that to rely on a reference under 35 U.S.C. 103, it must be analogous prior art (MPEP 2141.01(a)). Applicants submit that there is nothing analogous in the disclosed methods of Podszun and Neev. Indeed, for the reasons given above, the method of Neev is different from the claimed method and the method disclosed by Podszun in virtually every way not least of which is the actual method and the substrate to be used in the methods. Accordingly, the skilled artisan would have had no reason to consider the disclosure of Neev together with the disclosure of Podszun, since these relate to completely different types of processes.

In the Office Action mailed November 12, 2009, the Examiner alleges that Podszun and Neev represent analogous art. Now in the Advisory Action mailed March 23, 2010, the Examiner attempts to duck the fact that Podszun and Neev represent non-analogous art stating generically that these references attempt to address the same problem. However, this allegation by the Examiner continues to ignore the fact that the artisan is asked to take multiple leaps involving the method and the substrates for the method to make the substitutions/modifications alleged. Podszun and Neev simply have no relation to each other. As such, the artisan in possession of Podszun and Neev would not be motivated to selectively insert the absorber disclosed by Neev into the process of Podszun without also modifying the process of Podszun and the substrate of Podszun to be compatible with the entirety of the disclosure of Neev.

Even if the artisan were to make all the blind leaps that the Examiner alleges would be obvious, the disclosures of Podszun and Neev still fail to disclose the temperature control in step (b), where in the claimed invention heat is supplied to the layers to be sintered in order to bring them to an elevated temperature or to hold them at an elevated temperature below the melting or sintering temperature of the polymer being used. As stated above, in this way the electromagnetic energy needed for selective melting can be reduced. This necessitates the existence of a temperature-regulated build-up field, although it reduces the probability of the occurrence of curl (rolling up of corners and edges from the build-up plane, a phenomenon that can make it impossible to repeat step (a)). It is of decisive importance that the powder have the proper temperature (step b) before step (e) is performed. Otherwise the components could become warped or the melt may not coalesce properly, thus leading to poor components.

None of Kar, Melisaris, Kawasaki, Bredt, or Melisaris-2 cure this basic deficiencies in the disclosures of Podszun and Neev. Therefore, even when Podszun and Neev are viewed together with Kar, Melisaris, Kawasaki, Bredt, and/or Melisaris-2, the claimed invention would still not be obvious.

Withdrawal of these grounds of rejection is requested.

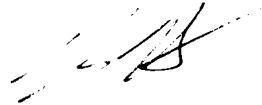
Finally, Applicants respectfully request that the provisional obviousness-type double patenting rejections of Claims 27-30 and 36-50 over Claims 27-29 and 35-49 of co-pending U.S. 11/587,758 be held in abeyance until an indication of allowable subject matter in the present application. If necessary, a terminal disclaimer will be filed at that time. Until such a time, Applicants make no statement with respect to the propriety of this ground of rejection.

However, the Examiner is reminded that MPEP §804 indicates that: "If "provisional" ODP rejections in two applications are the only rejections remaining in those applications, the examiner should withdraw the ODP rejection in the earlier filed application thereby permitting that application to issue without need of a terminal disclaimer."

Applicants submit that the present application is now in condition for allowance.
Early notification of such action is earnestly solicited.

Respectfully submitted,

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